CIIT

CENTERS FOR HEALTH RESEARCH

Roger → Rick

Please have a look at P. 3 "Scientific excellency..."

Could we mention our process in our annual Report as well? Roger share this at our staff meeting.

A NEW NAME TO REFLECT A GLOBAL VISION

Annual Report 2000

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CIIT

CENTERS FOR HEALTH RESEARCH

Contents

Senior research associate Linda Pluta (front) has trained CIIT researchers in the use of state-of-the-art, real-time instrumentation to quantify changes in gene expression. Among CIIT users of the sequence detection system and TaqMan® assay are (clockwise) postdoctoral trainee Dr. Georgette Hill, respiratory biology; Dr. Leslie Recio, cancer biology; and Dr. Kevin Gaido and postdoctoral fellow Dr. Katrina Waters, reproductive biology.

CIIT Centers for Health Research — A New Name to Reflect a Global Vision

Dr. Julia Kimbell and research associate Darin Kalisak are using a new computer program developed by external collaborator Dr. Grace Kepler to construct three-dimensional nasal models automatically. Dr. Kimbell's research on the effects of interindividual differences in human nasal anatomy on upper respiratory tract airflow and inhaled gas uptake is funded by the Risk Assessment Methods Technical Implementation Panel of the American Chemistry Council.

The CIIT Centers for Health Research (CIIT) is a private, not-for-profit research organization that was founded in 1974 and has been in operation since 1976. The mission of CIIT is to conduct state-of-the-art, mechanism-based research to provide an improved scientific basis for assessing the potential outcomes of environmental exposure to chemicals on human health.

Repositioning of CIIT

On December 4, 2000, the Chemical Industry Institute of Toxicology officially became the CIIT Centers for Health Research. The repositioning of CIIT, as indicated by the name change, reflects its new vision of preeminence in human health sciences research and education under the leadership of President William F. Greenlee. At the same time, the new name acknowledges CIIT's roots in toxicology research supported by the chemical industry. As symbolized by its new logo, CIIT is seeking to expand its role in global research initiatives to assess the effects of environmental exposures to chemicals on human health.

Creation of Technology-Based Research Centers

A key component of CIIT's vision is the development of technology-based research centers to support and strengthen the research programs. Two centers were created in 2000 — the Center for Integrated Genomics and the Center for Computational Biology and Extrapolation Modeling.

The CIIT Center for Integrated Genomics will provide centralized equipment, expertise, and training for studies of gene expression. These studies will elucidate the links between changes in gene expression and specific effects induced by chemicals. Data from the studies will also be used to develop biological markers for assessing the effects of exposure to chemicals.

The CIIT Center for Computational Biology and Extrapolation Modeling will integrate quantitative toxicology into the research programs. Scientists in the Center will develop biologically based dose-response models that will be integral to assessments of risk to human health from environmental exposure to chemicals.

CIIT's Alliance with the American Chemistry Council

In January 1999, the Board of Directors of the American Chemistry Council approved a Long-Range Research Initiative (LRI), which sponsors research on the health and environmental effects of chemical use. In developing its research initiative, the American Chemistry Council formed an alliance with CIIT. This alliance builds on CIIT's 25 years of experience in toxicology research and the scientific credibility that CIIT

Dr. Bahman Asgharian (left) received a grant from the U.S. Environmental Protection Agency in 2000 to study the inhalability of particulate matter in laboratory animals. Dr. Gregory Kedderis entered into a cooperative agreement with EPA in 2000 to develop chemical-specific, human, physiologically based pharmacokinetic models for adults and children.

has earned throughout the world. Through the LRI, support for CIIT is being enhanced and consolidated into sponsorship by the entire membership of nearly 200 companies of the American Chemistry Council.

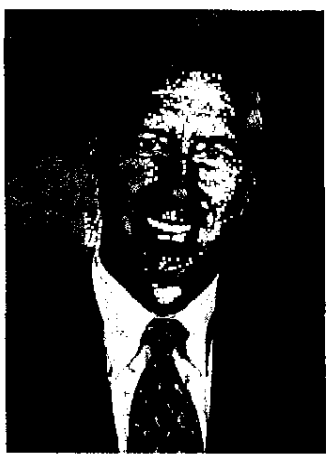
Scientific Credibility and Independence of CIIT

When CIIT was founded, the CIIT Board of Directors established guidelines for the conduct of research and the dissemination of research results. The founding Board indicated that all research findings should be analyzed and prepared for publication in a timely manner regardless of study outcome. Furthermore, the Board specified that all manuscripts should undergo internal review and be submitted to peer-reviewed journals for publication. And finally, research results should be disseminated broadly to all interested parties without giving preference to CIIT member companies.

These guidelines have been rigorously followed and have contributed greatly to the scientific credibility that CIIT as an institution and its scientific staff have earned. The American Chemistry Council follows the same basic guidelines in its alliance with CIIT, thereby underscoring the chemical industry's commitment to public release of scientific information irrespective of the outcome of specific research projects.

Message from the Chair of the Operating Board

CIIT is repositioning itself to focus on the human health issues of highest importance to its sponsors and the public at large.



Eugene D. Ervin
Chair of the Operating Board

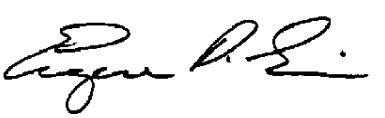
The year 2000 was one of transition for CIIT and of strengthening its position as a world-class research and education institution in environmental and human health sciences. CIIT is repositioning itself from an institute organized around four programs to one that is focused on the human health issues of highest importance to its sponsors and the public at large. These high-priority issues include children's health, endocrine-active compounds, cancer, airborne particulates, exposure assessment and tissue dosimetry, and development of new risk assessments.

On the surface, this repositioning is reflected in CIIT's new name, the CIIT Centers for Health Research. The name change more accurately reflects CIIT's mission and emphasizes its broader role in evaluating the impact of chemical exposures on human health. But the changes go much deeper and will result in an organization that will lead the way in understanding the effects of chemical exposures on human health. CIIT's new structure emphasizes its scientific strengths in the broad disciplinary areas of genomics, systems biology, computational biology, extrapolation modeling, and risk assessment. Centers within these disciplines will utilize CIIT's scientific strengths in traditional system-oriented toxicology and will enable CIIT to more effectively integrate its fundamental scientific skills with key disciplines now and in the future.

CIIT's alliance with the American Chemistry Council has brought an issues-driven perspective to CIIT and a solid funding base that allows it to concentrate on important human health issues that face the chemical industry and the public. This dedicated funding also gives CIIT the ability to aggressively pursue additional funds from government, industry, and private foundations. These additional grants will be closely aligned with the programs supported by its core funding and will greatly enhance CIIT's ability to expand its research efforts and further advance the science in key program areas. The Operating Board has approved a Health Research Education Foundation, which will further support CIIT's research activities by providing a new mechanism for funding the post-doctoral and other educational programs.

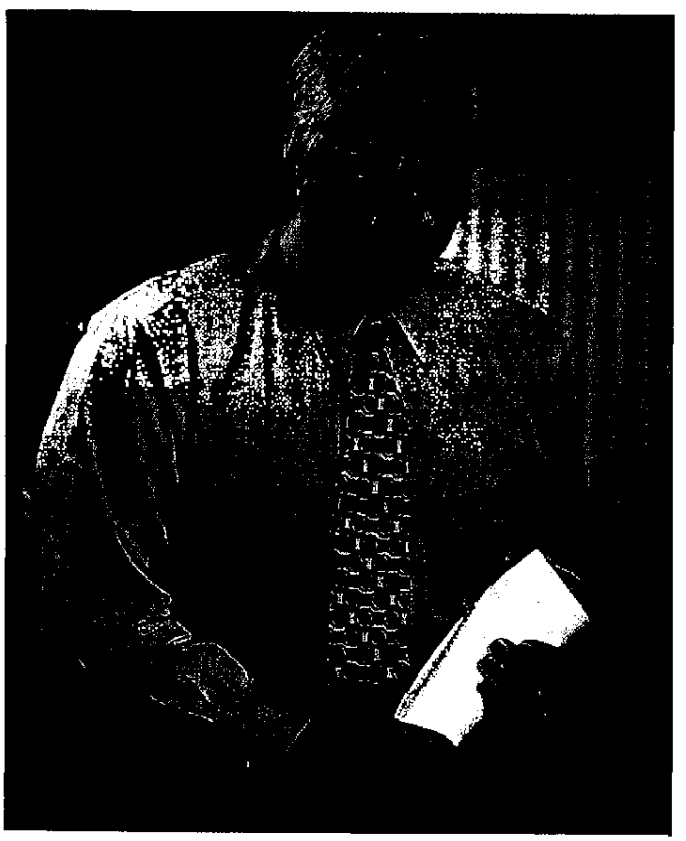
Very closely tied to the organizational repositioning is Dr. Greenlee's significant commitment to recruiting top-level scientists. While CIIT's scientific staff has always been high-caliber, the ability to compete for key research grants and remain on the cutting edge of science requires the continued recruitment of highly regarded scientists who are advancing the state of the art. While we are early in the recruiting effort, changes at CIIT over the past year have created a setting that will attract new talent. Supporting CIIT's scientists and its expanded research agenda will be a state-of-the-art facility with the technology needed to conduct world-class research. Dr. Greenlee has developed and the Operating Board has approved a $5 million plan to expand and upgrade CIIT's research facilities. This investment will occur over the next several years and is expected to be only the first step in meeting our facility needs.

At this point, it should be clear that significant changes are occurring at CIIT, changes that will have a dramatic impact on its ability to recruit top-level scientists and to conduct leading-edge research. Over the years, CIIT has played a key role in understanding the impact of chemicals on human health. CIIT begins the new millennium with a solid foundation to make it the preeminent institution in human health sciences research.



Message from the President

With a strong foundation of scientific excellence and unwavering commitment to research that benefits human health, CIIT moves boldly forward into the new millennium.



William F. Greenlee, Ph.D.
President

I would like to take the opportunity to share with you some of the exciting changes occurring at CIIT. On December 4, 2000, CIIT officially became the CIIT Centers for Health Research. The mission of CIIT remains unchanged. Our vision is to achieve preeminence as a world-class research and education institution in environmental and human health sciences.

The overall goal in restructuring CIIT around interdisciplinary centers is to facilitate the formation of issues-driven research programs that bring state-of-the-art science to crosscutting and emerging environmental and public health issues relevant to the concerns of our sponsors and society at large. These issues include children's health, environmental exposures and tissue dosimetry, endocrine-active compounds, genomics, air toxics, and susceptible populations.

In 2000, we established the Center for Integrated Genomics and the Center for Computational Biology and Extrapolation Modeling. These centers represent opportunities to attract new revenues and to provide technical expertise, shared capital equipment, and education and training cores on an institute-wide basis. Other centers are being created, and new initiatives for interdisciplinary research and education programs are underway.

An important outcome of our research is to provide an appropriate biological context for the design and interpretation of chemical tests that are being conducted by government, industry, and other laboratories in fulfillment of the commitment to the High-Production-Volume Chemical Challenge Program of the United States Environmental Protection Agency. We want to be a valued contributor to the process to help ensure that the best scientific information is used in regulatory and policy decisions.

CIIT continues its strong commitment to the education and training of graduate students and postdoctoral scientists. In addition to the core funding allocated to the Postdoctoral Training Program, several trainees have been successful in obtaining competitive National Research Service Awards from the National Institute of Environmental Health Sciences. Through partnership with the North Carolina Association for Biomedical Research, CIIT scientists participate in local education programs for kindergarten through 12th grade. In 2001, CIIT will be the host institution for two high school science teacher workshops.

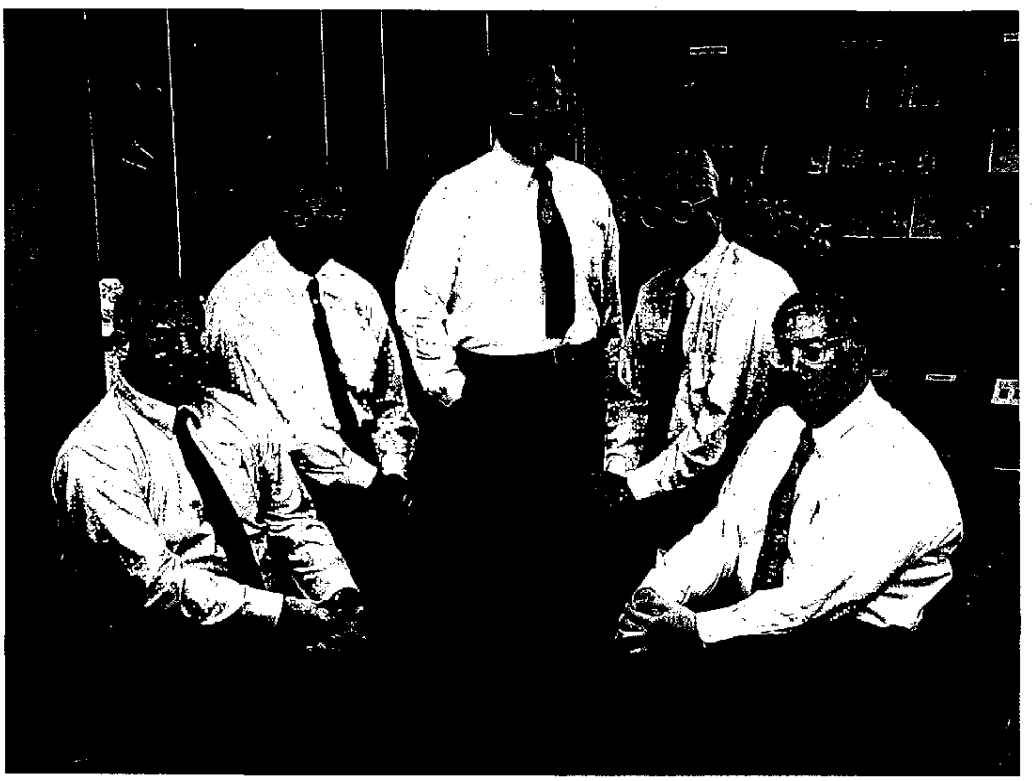
The CIIT alliance with the American Chemistry Council stabilizes the core funding base for environmental and public health research and education at $16 million annually. To leverage and enhance the value of the chemical industry investment, CIIT has launched an aggressive plan to obtain external funding from government sources as well as private foundations. The overall strategy for expanding CIIT's revenue base is to recruit new scientific talent, increase the competitiveness of the current senior scientific staff for peer-reviewed external funding, and establish structures within CIIT that will be eligible for support from relevant foundations. To assure the success of this plan, the CIIT Board has approved major capital investments in the facility and in new technologies.

In 2001, CIIT celebrates its 25th anniversary. The year ahead brings both exciting opportunities and challenges. I am confident that CIIT will not only enjoy the fruits of current efforts but will continue to realize the vision of its founders. With a strong foundation of scientific excellence and unwavering commitment to research that benefits human health, CIIT moves boldly forward into the new millennium. In closing, I would like to personally thank all the sponsors, leaders, staff, and friends of CIIT who have contributed to and shared in its past successes. With your continuing support, the future is indeed bright.

William F. Greenlee

The CIIT Research Programs

The focus of CIIT research is on current and emerging issues surrounding environmental exposure to chemicals.



The CIIT Research Leadership Group: (left to right) Dr. Paul Foster, Director of the Endocrine, Reproductive, and Developmental Toxicology Program; Dr. Fred Miller, Director of the Respiratory Toxicology Program; Dr. Owen Moss, Director of Research Support; Dr. Gregory Kedderis, Director of the Chemical Carcinogenesis Program; and Dr. David Dorman, Director of the Neurotoxicology Program.

CIIT's interdisciplinary research programs address human health issues that are of highest priority to its industry sponsors and society at large. CIIT promotes the use of peer-reviewed science in risk assessments in the firm belief that science-driven regulatory policies best serve the goal of protecting human health.

For the past several years, CIIT research has been organized into four programs: chemical carcinogenesis; endocrine, reproductive, and developmental toxicology; neurotoxicology; and respiratory toxicology. Current and emerging issues surrounding environmental exposure to chemicals drive the research projects within each program. In 2000, critical research issues addressed by CIIT scientists involved airborne particulates, chemical carcinogenesis, children's health, endocrine-active compounds, genomics, risk assessment, and tissue dosimetry.

Chemical Carcinogenesis Program

The vision of the Chemical Carcinogenesis Program is to understand the mechanisms by which chemicals cause cancer. Our overall goal is to protect people from environmental carcinogens by contributing to the development of meaningful predictive assays and risk assessments driven by biological mechanisms.

The Chemical Carcinogenesis Program is organized around four areas: (1) furthering the scientific bases for interspecies comparisons with emphasis on the human relevance of rodent cancer models; (2) developing accurate models such as transgenic animals to identify potential carcinogens; (3) understanding dose-response factors that alter the cancer response such as metabolic differences, cellular susceptibility, and pharmacokinetics; and (4) examining sensitive subpopulations with an emphasis on genetic predisposition and issues involving children's health.

Research in the Chemical Carcinogenesis Program utilizes whole animals, intact cells from normal and transformed tissues of animals and humans, and biological macromolecules such as RNA and DNA to investigate the modes and mechanisms of action of carcinogenic chemicals. Studies with intact animals and with tissue preparations from animals and humans provide key information

In a study published in 2000, postdoctoral fellow Dr. Scott Boley examined genetic mechanisms involved in the development of tumors in transgenic mice following exposure to benzene. His work supports the use of the *p53*+/- transgenic mouse as a model for studying genetic alterations involved in the development of human cancers.

on the metabolic activation and target organ dosimetry of chemical carcinogens. This information is needed for scientifically accurate assessments of risk to humans from exposure to potentially carcinogenic chemicals. Studies using genetically modified animals probe the molecular mechanisms involved in the carcinogenic action of chemicals and emphasize the potential role of mutations in genes that control cell growth and death.

Among the new technologies that scientists in the Chemical Carcinogenesis Program have incorporated into their research are genetically engineered animals to probe the involvement of specific genes in the bioactivation of chemical carcinogens and DNA microarrays to examine biological changes in target tissues as they progress to cancers. Genetically engineered animals with mutations in key genes controlling growth may provide rodent cancer models that are more relevant to human beings. For example, loss of *p53* function is the most common genetic alteration in human cancer. The *p53* gene is involved in cell cycle regulation, DNA repair, and apoptotic cell death. Transgenic mice with only one copy of *p53* (*p53*+/-) are being studied as potential short-term cancer models and models of human cancer. We found that inhalation exposure of *p53*+/- mice to the known human carcinogen benzene for 36 weeks induced a high incidence of thymic lymphomas. Molecular analyses of the *p53* gene in these tumors revealed that loss of the functional *p53* locus due to aberrant chromosomal recombination was a common event (Boley et al., 2000). Similar mechanisms are known to occur in certain human cancers such as retinoblastoma and leukemia, suggesting that the *p53*+/- transgenic mouse is a useful animal model for studying molecular events relevant to the development of human cancers. Studies with *p53*+/- transgenic mice exposed to the water disinfection byproduct bromodichloromethane are also underway.

Endocrine, Reproductive, and Developmental Toxicology Program

The vision of the Endocrine, Reproductive, and Developmental Toxicology Program is to understand the biologically based mechanisms that endocrine-active chemicals employ in the induction of adverse effects and to use this information in human health risk characterization. The major direction of our work remains the study of reproductive development with a focus on steroid action. The overall goals of the program are to (1) develop quality information for use in reasoned risk assessments for endocrine-active chemicals, (2) establish detailed descriptions for understanding the toxicology of endocrine-active chemicals with specific modes of action during reproduction and development, and (3) build a bridge between the new molecular and other biological end points relevant to the endocrine system and the familiar, clearly adverse end points.

Research in the Endocrine, Reproductive, and Developmental Toxicology Program currently has excellent alignment with at least two major issues facing the chemical industry, as identified by the American Chemistry Council: the potential for endocrine-active chemicals to produce effects on human health and the potential to have long-term effects on children's health. The International Council of Chemical Associations has outlined five key research components essential to the industry: (1) screening and testing methodology for endocrine-active chemicals, (2) mechanistic studies in support of potential effects on human and environmental health, (3) improvements in risk assessment methodology for endocrine-active chemicals, (4) generation of information on the effects of such agents in human populations, and (5) similar studies in wildlife populations. CIIT has expertise in the first three of these areas.

In children's health issues, two major concerns are the potential increases in childhood disease and the nature of childhood exposures that may result in disease later in life. CIIT research has been directed specifically at the effects of exposure of the fetus and neonate up

Postdoctoral fellow Dr. Barry McIntyre (left) and postdoctoral trainee Dr. Norman Barlow were coauthors of an article published in 2000 on the effects of prenatal exposure to linuron on reproductive development in male rats. Information obtained in the study on the ability of linuron to produce toxicity through a hormone-dependent mechanism will help characterize antiandrogenic effects on reproductive development.

to the weaning stage on the ability of offspring to successfully reproduce as adults. In particular, we are examining the hypothesis that a number of deficits in human male reproduction have a prenatal origin.

In an article by Eve Mylchreest and colleagues (2000), we were able to delineate dose-response relationships for changes in reproductive development in the rat induced by the phthalate ester di(*n*-butyl) phthalate (DBP). In this study, DBP had a multitude of different effects on the male reproductive system, including clear malformations. DBP and other phthalate esters have been the subject of intense scientific and public interest. The Center for the Evaluation of Risks to Human Reproduction of the National Toxicology Program chose this class of chemicals as the first to be evaluated by its expert committee. The Mylchreest article was the critical paper used in the risk assessment by the DBP panel because it was designed to investigate those end points particularly sensitive to the action of DBP, utilized a wide range of dose levels, and had a clear no-observed-adverse-effect level (NOAEL). In more recent studies by other researchers, the major metabolite of DBP was present in the urine of women in the control population at levels much higher than previously encountered, but these levels are still two orders of magnitude less than the NOAEL established in the Mylchreest article.

In another article published in 2000, Barry McIntyre and colleagues were able to establish the herbicide linuron as a competitive androgen receptor antagonist. Their study also indicated that the agent interfered with reproductive development in male rats, including producing malformations at and below levels previously shown to be the NOAEL for reproduction in this species. The detailed characterization of linuron in a transgenerational study design has enabled the collection of improved information on its ability to produce toxicity through a hormone-dependent mechanism. Moreover, the effects noted with this androgen receptor antagonist are in stark contrast to those induced by a more potent antagonist, the pharmaceutical flutamide. These data indicate that simple in vitro assays for androgen receptor binding and gene transcription are not adequate for predicting the extent or nature of any potential adverse effect of an agent in whole animals when given during critical developmental periods.

Dr. David Dorman and research associate Marianne Marshall use graphite furnace atomic absorption spectrometry to analyze tissues of animals exposed to manganese. Dr. Dorman was senior author of a study published in 2000 showing that delivery of inhaled manganese to the rat brain occurred via the olfactory nerve rather than via blood circulation.

Neurotoxicology Program

The vision of the Neurotoxicology Program is to be a leader in developing approaches that elucidate mechanisms of action and exposure risks of chemicals adversely affecting the developing and mature nervous systems. The focus of research in the program is on evaluating the effects of neurotoxic chemicals on potentially sensitive subpopulations and the application of pharmacokinetics to the risk assessment of neurotoxicants.

Accidental exposure to extremely high levels of hydrogen sulfide can result in unconsciousness, memory and motor dysfunction, and other neurological effects. However, more information is needed about the effects of low levels. CIIT research on hydrogen sulfide is intended to improve our understanding of the health effects associated with chronic, low-level exposure to this noxious gas. In a study published in 2000, David Dorman and colleagues examined whether exposure of pregnant rats and their newborn pups to hydrogen sulfide would result in neurotoxicity in the offspring. End points included tests to evaluate the motor activity and cognitive function of the exposed pups as well as a detailed evaluation of their nervous systems for the presence of neuropathology. Our study showed that exposure to hydrogen sulfide is unlikely to result in significant reproductive toxicity or developmental neurotoxicity following exposures at concentrations relevant for most occupational and environmental exposures. This work and results of other CIIT studies were presented in the fall of 2000 at the Hydrogen Sulfide Health Research and Risk Assessment Symposium, Chapel Hill, North Carolina.

CIIT continues to make significant contributions to understanding the pharmacokinetics and neurotoxicity of inhaled manganese. The brain is protected by the presence of a blood-brain barrier that

excludes many xenobiotics from the central nervous system. However, a direct interface between the air and nervous system exists within the olfactory system. We demonstrated that direct delivery of inhaled manganese to the brain predominantly occurred in rats via the olfactory nerve (Brenneman et al., 2000). This finding runs contrary to the belief that most of the inhaled manganese delivered to the brain occurs via the blood circulation and has significant implications for many other inhaled particulates.

Respiratory Toxicology Program

The vision of the Respiratory Toxicology Program is to advance our understanding of the biological mechanisms by which toxic agents exert their effects on the respiratory tract and to improve our ability to incorporate dosimetry into interspecies extrapolation modeling and risk assessment. Our overall goal is to make biologically based dose-response modeling the norm in future quantitative risk assessments of inhaled material.

The focus of the Respiratory Toxicology Program is on providing information for various components of an exposure-dose-response paradigm. Two broad goals guide the development of projects within the program: (1) understanding the mechanisms by which inhaled material produces disease with emphasis on examining species- and material-specific factors and (2) using the knowledge gained to improve extrapolation modeling and approaches to risk assessment.

In keeping with current industry priorities, research objectives over the next five years will primarily focus on concerns about ambient particulate matter standards and the identification of subpopulations that may be particularly susceptible to effects from exposure to a given chemical or inhaled material. The toxicological research is directed toward the pathogenesis of respiratory tract disease and centers on the development and characterization of the responses of compromised animals to particulate matter challenge. Research in 2000 focused on developing mouse models of pulmonary inflammation involving either allergy or viral infection. Dosimetry research was directed toward interspecies extrapolation and was focused on deposition and clearance patterns of inhaled particles and absorption of gases throughout the respiratory tract as well as the effects of individual and species-specific anatomy on deposition patterns. In both the toxicological and dosimetry components of the research program, we envision a much greater emphasis on the use of mice as a test species to take advantage of major scientific advances in murine genetics and the availability of genetically engineered mouse models of human disease states.

A major study on the pulmonary responses of rats, mice, and hamsters exposed subchronically to pigment-grade titanium dioxide particles was completed in 2000. Developing an understanding of the appropriateness of the rat as a model for studies of poorly soluble particulate materials was the overarching objective of the research on titanium dioxide. Specific emphasis was placed on issues surrounding particle-induced impairment of macrophage-mediated lung clearance in these studies. A study published in 2000 by Jeffrey Everitt and colleagues describes epithelial metaplastic and fibroproliferative changes in alveoli unique to the rat under conditions of lung overload. These pathologic findings were associated with high, persistent neutrophilic inflammation that was unique to the rat following impairment of macrophage-mediated clearance. More detailed publications are in preparation.

In collaboration with scientists from the Institute of Physics and Biophysics at the University of Salzburg and the Department of Neuroscience at New York State Psychiatric Institute, we used various models of lung anatomy to demonstrate the importance of lung structure on the variability of particle deposition deep in the lungs of rats (Hofmann et al., 2000). Mean total bronchial and alveolar (acinar) deposition fractions were similar for all models examined. However, the model structures that incorporated more of the known asymmetry in the lung predicted substantial variation in particle deposition among different acini. This finding may explain why the distribution of lesions is often noted as being patchy in low-exposure studies of particulate matter.

Dr. Bahman Asgharian (front) and visiting scientist Dr. Werner Hofmann published a study in 2000 on the use of stochastically generated lung models to study deposition and clearance of insoluble particles in the respiratory tracts of humans and rats. Dr. Hofmann is Head of the Institute of Physics and Biophysics at the University of Salzburg.

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McIntyre, B. S., Barlow, N. J., Wallace, D. G., Maness, S. C., Gaido, K. W., and Foster, P. M. D. (2000). Effects of *in utero* exposure to linuron on androgen-dependent reproductive development in the male Crl:CD(SD)BR rat. *Toxicol. Appl. Pharmacol.* 167, 87–99.

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*Outside author.

Outreach

CIIT has gained its scientific reputation through widespread communication of sound science to diverse audiences.

CIIT has gained its scientific reputation through widespread communication of sound science to diverse audiences. CIIT's outreach efforts begin with publication of research results in the peer-reviewed literature. CIIT scientists also publicize their work through presentations at scientific meetings, service in scientific advisory positions, and participation in professional organizations. Our scientists serve as peer reviewers and in editorial positions for journals, and they participate in the education of future toxicologists as adjunct faculty at area universities. Information about CIIT is readily available to both the scientific community and the public through the serial publication *CIIT Activities* and the CIIT Web site (www.ciit.org).

The International Agency for Research on Cancer invited Dr. Susan Borghoff to serve on a 2000 Working Group to evaluate the carcinogenic risks to humans of some industrial chemicals. The U.S. Environmental Protection Agency appointed Dr. Fred Miller (left) to the Clean Air Scientific Advisory Committee and Dr. Paul Foster to the Environmental Health Committee in 2000.

Scientific Publications

According to CIIT's By-Laws, research results and other data are to be published or otherwise made public and available to all on a reasonable basis. In 2000, 50 research articles, review articles, book chapters, and other scientific documents were published, and 39 manuscripts were submitted or in press by the end of the year.

CIIT researchers frequently collaborate with scientists at other laboratories. CIIT scientists were coauthors of research articles published in 2000 with collaborators from Arrhenius Laboratories for Natural Sciences, Stockholm, Sweden; AstraZeneca Central Toxicology Laboratory, United Kingdom; Baylor College of Medicine; BP Chemicals Inc.; ChemRisk Service of McLaren/Hart, Inc.; DuPont Haskell Laboratory; Institute of Physics and Biophysics, University of Salzburg; Instituto Nacional de Pediatria, Mexico City; National Institute of Environmental Health Sciences; National Institute for Working Life, Stockholm, Sweden; New York State Psychiatric Institute; North Carolina State University; Shell International Chemicals B.V., Amsterdam; Shell Research and Technology Center, Amsterdam; United States Environmental Protection Agency; University of Connecticut; University Hospital, Uppsala, Sweden; University of North Carolina at Chapel Hill; University of Texas M. D. Anderson Cancer Center; and Wright-Patterson Air Force Base.

Scientific Presentations and Interactions

As part of CIIT's commitment to the public dissemination of research results, scientists regularly present their work at national and international meetings and exchange information with colleagues throughout the world. In 2000, CIIT scientists reported their research in more than 175 platform and poster presentations and participated in more than 180 formal interactions with other scientists.

Scientific Advisory Positions

CIIT scientists are frequently called upon to serve in advisory positions to organizations representing governmental, industrial, and public health concerns. In 2000, CIIT researchers served on committees or working groups of the National Institute of Environmental Health Sciences, National Occupational Research Agenda, National Research Council of the National Academy of Sciences, National Toxicology Program, and

United States Environmental Protection Agency (U.S. EPA). Outside the United States, staff scientists were advisors to subgroups of the European Centre for Ecotoxicology and Toxicology of Chemicals (ECETOC), German Research Council, International Agency for Research on Cancer, International Programme on Chemical Safety, and World Health Organization. CIIT is also represented on the Board of Directors of the North Carolina Association for Biomedical Research, the Advisory Committee of the North Carolina Genomics and Bioinformatics Consortium, and the Science Advisory Committee of the Environmental Lung Center at the National Jewish Medical and Research Center in Denver.

Dr. Susan Borghoff was invited by the International Agency for Research on Cancer (IARC) to be a member of a Working Group of experts who met February 15–22, 2000, in Lyon, France. Their work was published in 2000 as Volume 77 of the *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans: Some Industrial Chemicals.*

Dr. Paul Foster and Dr. Frederick Miller were appointed to committees of the U.S. EPA for two-year terms beginning October 1, 2000. Dr. Foster was appointed to the Environmental Health Committee (EHC) and Dr. Miller to the Clean Air Scientific Advisory Committee (CASAC) of the Science Advisory Board. The principal focus of the EHC is on issues related to the development and use of guidelines for health risk assessments. The mandate of the CASAC is to review and offer scientific and technical advice to the EPA Administrator on the air quality criteria and regulatory documents that form the basis for the national ambient air quality standards.

Events Sponsored by CIIT

CIIT was host or cosponsor of six scientific events held in the Research Triangle during 2000.

The public session of the 2000 CIIT Annual Meeting was held on May 9 in Cary, North Carolina. Dr. Carol Henry and Dr. James Bus, Co-Leaders of the Strategic Science Team of the American Chemistry Council, gave the keynote address on the Council's Long-Range Research Initiative. Dr. Michael Czech, Professor and Director of the Program in Molecular Medicine at the University of Massachusetts, gave the 2000 CIIT Founders' Award presentation on "Fat As an Endocrine Organ: Target for Environmental Toxins."

The 24th Annual CIIT Scientific Open House was held on October 10. Six CIIT scientists presented key research findings on the health effects of low-level exposure to hydrogen sulfide, the risks to human health from exposure to formaldehyde, the mechanism of di(*n*-butyl) phthalate toxicity, the molecular basis for dioxin actions in humans, the effects of interindividual differences in anatomy on uptake of inhaled materials in the upper respiratory tract, and the *p53*+/- mouse as a short-term cancer model.

CIIT cosponsored and participated in several events held in the Research Triangle during 2000. The Hydrogen Sulfide Health Research and Risk Assessment Symposium, which was held October 31–November 2 in Chapel Hill, brought together scientists who study the health effects of hydrogen sulfide and agencies charged with protecting the public health. A workshop on Barriers and Bridges: Integrating Health and Ecological Risk Assessment was held October 30–31 at North Carolina State University to promote dialogue between health and ecological risk assessors. CIIT was a cohost of the third annual Science Fair held on April 28 at the National Institute of Environmental Health Sciences to encourage the exchange of scientific information among area postdoctoral fellows. An education workshop for members of the North Carolina Chapter of the Society of Toxicology was held at CIIT on October 20 to demonstrate techniques for making toxicological research accessible to students in kindergarten through 12th grade.

Participation in Professional Organizations

CIIT scientists actively participate in some 50 professional organizations representing a wide range of scientific disciplines. CIIT continues to have a significant presence in the Society of Toxicology (SOT). A number of scientists served as officers and members of various SOT subgroups in 2000. CIIT President Dr. William Greenlee was elected Vice President-elect of SOT in March 2000 and is thereby in line to become President in 2002.

Editorial Appointments

CIIT scientists contribute to the quality of research publications by serving as peer reviewers of research articles for national and international journals. Scientific staff members also serve on the editorial boards of the *Archives of Toxicology, Chemico-Biological Interactions, Drug Metabolism and Disposition, Inhalation Toxicology, International Journal of Toxicology, Journal of Pharmacology and Experimental Therapeutics, Mutagenesis, Reproductive Toxicology, Toxicologic Pathology, Toxicological Sciences, Toxicology,* and *Toxicology Letters*. Dr. Timothy Fennell is an Associate Editor of *Biomarkers*, and Dr. Paul Foster is an Associate Editor of *Toxicological Sciences*.

Academic Appointments

CIIT senior scientists participate in the academic community of the Research Triangle by presenting lectures at area universities and serving on graduate student committees. In 2000, 12 CIIT scientists held adjunct faculty appointments in a number of programs at area universities: the Department of Mathematics, Integrated Toxicology Program, and Nicholas School of the Environment at Duke University; the College of Physical and Mathematical Sciences, College of Veterinary Medicine, and Department of Toxicology at North Carolina State University; and the Curriculum in Toxicology and School of Medicine at the University of North Carolina, Chapel Hill. Dr. Frederick Miller is a Medical Research Professor at Duke University Medical Center.

CIIT Communications

For 20 years, CIIT has communicated its work to a wide audience through *CIIT Activities*, a serial publication featuring science articles on key research findings and news articles about CIIT's contributions to the research community. A new design incorporating CIIT's new name and logo was implemented in the November–December 2000 issue. *CIIT Activities* is distributed internationally at no charge to interested subscribers.

The CIIT Web site (www.ciit.org) includes information about the research and education programs, a searchable database of all scientific publications by CIIT researchers, news briefs, announcements of upcoming events, and employment opportunities. *CIIT Activities* and the *CIIT Annual Report* are posted on the site as pdf files. The CIIT Web site also has links to sites of biological, chemical, and environmental interest and to CIIT supporting companies.

Education and Training Programs

CIIT alumni have been major contributors to knowledge about the health effects of chemicals.

Joining the CIIT Postdoctoral Training Program in 2000 were (front) Dr. Paul Cornwell, Dr. Katie Turner, Dr. Michael Wyde, Dr. Darren Robinson; (back) Dr. Heiko Käfferlein, Dr. Alison Bauer, and Dr. Amy Lambert.

One of the goals of the CIIT founders was to promote the professional development and training of scientists in toxicology and related fields. As a result of its strong commitment to education over the past 25 years, CIIT alumni have been major contributors to knowledge about the health effects of chemicals. To date, 188 postdoctoral fellows and trainees, 66 predoctoral fellows, 104 summer interns, and 48 visiting scientists have participated in the CIIT education and training programs.

Postdoctoral Training Program

Scientists who have recently completed advanced degrees enter the Postdoctoral Training Program to gain further research experience under the mentorship of CIIT scientists. Postdoctoral fellows hold Ph.D. degrees, while trainees hold D.V.M. or other degrees in the medical sciences and are enrolled in Ph.D. programs at area universities. CIIT fellows and trainees present their research at scientific meetings and publish their work in peer-reviewed journals.

Eight postdoctoral fellows and trainees completed their appointments in 2000 and accepted professional positions:

Karrie A. Brenneman, D.V.M., Ph.D.
IDEXX Veterinary Services
Portland, Oregon

Laura N. Healy, D.V.M., Ph.D.
GlaxoSmithKline
Pharmaceutical Research and Development Facility
King of Prussia, Pennsylvania

Frederic J. Moulin, D.V.M., Ph.D.
Bristol-Myers Squibb Pharmaceutical Research Institute
Princeton, New Jersey

Stephen A. Ploch, Ph.D.
Covance Laboratories, Inc.
Madison, Wisconsin

Edward E. Reverdy, Ph.D.
Advanced Inhalation Research, Alkermes, Inc.
Cambridge, Massachusetts

Valerie D. Shultz, Ph.D.
Sanofi-Synthelabo Research
Malvern, Pennsylvania

Anja J. Stauber, Ph.D.
Eli Lilly and Company
Lilly Research Laboratories
Greenfield, Indiana

Tracy M. Williams, Ph.D.
Eli Lilly and Company
Indianapolis, Indiana

Predoctoral Training Program

Predoctoral fellows are enrolled in Ph.D. programs at universities in the Research Triangle and conduct their dissertation research at CIIT. The CIIT scientist guiding the research serves on the student's doctoral committee and typically holds an adjunct faculty appointment at the university awarding the degree.

Predoctoral fellow **Amy Collins Licata** completed the requirements for a Ph.D. degree in biomathematics with a concentration in mathematical methods from North Carolina State University in 2000. Her dissertation is titled *Physiologically Based Pharmacokinetic Models for Gasoline Oxygenates: Implementing Statistical and Mathematical Analyses*. Her research at CIIT was conducted under the mentorship of Dr. Susan Borghoff, Chemical Carcinogenesis Program. Dr. Licata is currently a research statistician at Research Triangle Institute, Research Triangle Park, North Carolina.

Summer Internship Program

CIIT added a Summer Internship Program to its training mission in 1989 to encourage undergraduate and graduate students to consider careers in health-effects research and related disciplines. Interns participate in on-going research projects under the mentorship of CIIT scientists and present their results to the staff at the end of summer. Many of CIIT's interns have gone on to earn graduate degrees in toxicology and related fields. In 2000, seven summer interns conducted research in cancer biology, neurobiology, and reproductive biology at CIIT.

Visiting Scientists

Visiting scientists from the United States and abroad come to CIIT to acquire further expertise in specialized techniques and to collaborate with CIIT scientists. In 2000, external scientists conducted research in the Endocrine, Reproductive, and Developmental Toxicology Program and Respiratory Toxicology Program at CIIT.

Professor Dr. Werner Hofmann
Head
Institute of Physics and Biophysics
University of Salzburg
Salzburg, Austria

Annie M. Jarabek
Special Assistant to the Associate Director for Health
National Center for Environmental Assessment
United States Environmental Protection Agency
Washington, DC

C. Lee Robinette, Ph.D., D.V.M.
Associate Professor
Department of Anatomy, Physiological Sciences, and Radiology
College of Veterinary Medicine
North Carolina State University

Madhabananda Sar, B.V.Sc. A.H. (D.V.M.), Ph.D.
Research Professor Emeritus
Department of Pediatrics
University of North Carolina at Chapel Hill

Science Advisory Committee

Peer review by external scientists helps to ensure the credibility of CIIT research.

The Science Advisory Committee is a group of independent scientists who advise CIIT on the scientific quality and productivity of its intramural and extramural research programs. The primary responsibilities of the Committee are to address the quality, relevance, and scientific independence of CIIT research, to address the performance of CIIT in fulfilling the research objectives of its industry sponsors, and to provide guidance to the President of CIIT in his oversight of the research programs. Committee members are internationally recognized scientists from academia, government, and industry who have expertise in the types of research conducted at CIIT. This external peer review helps to ensure the credibility of CIIT research.

Chairman of the 2000–2001 Science Advisory Committee is Dr. Henry Pitot, McArdle Laboratory for Cancer Research, University of Wisconsin. The 18 members of the Committee met at CIIT August 21–23 to review the proposed five-year CIIT strategic plan as well as the four CIIT research programs.

Members of the 2000–2001 Science Advisory Committee: (front row, left to right) Dr. M. W. Anders, Dr. Claude Hughes, Jr., Dr. Kenneth Korach, Committee Chairman Dr. Henry Pitot, Dr. David Kaufman, Dr. Robert Kavlock; (second row) Dr. Doyle Graham, Dr. Frank Gonzalez, Dr. Gary Stoner, Dr. Suresh Moolgavkar, Dr. Brooke Mossman, Dr. Samuel Cohen; (third row) Dr. Janice Chambers, Dr. Richard Schlesinger, Dr. Günter Oberdörster; (back row) Dr. George Lucier, Dr. Richard Sharpe, and Dr. Raymond Tennant.

2000–2001 Science Advisory Committee

Henry C. Pitot, M.D., Ph.D., Chair
Professor of Oncology and Pathology and Laboratory Medicine
McArdle Laboratory for Cancer Research
University of Wisconsin, Madison

M. W. Anders, D.V.M., Ph.D.
Professor Emeritus, Department of Pharmacology and Physiology
University of Rochester Medical Center

Janice E. Chambers, Ph.D.
William L. Giles Distinguished Professor
College of Veterinary Medicine
Mississippi State University

Samuel M. Cohen, M.D., Ph.D.
Professor and Chairman, Department of Pathology and Microbiology
University of Nebraska Medical Center

Frank J. Gonzalez, Ph.D.
Chief, Laboratory of Metabolism, Division of Basic Sciences
National Cancer Institute
National Institutes of Health

Doyle G. Graham, M.D., Ph.D.
Professor and Chair, Department of Pathology
Vanderbilt University Medical Center

Claude L. Hughes, Jr., M.D., Ph.D.
Avalon Medical Group, Chapel Hill, North Carolina
Consulting Professor, Department of Obstetrics and Gynecology, and faculty member, Integrated Toxicology Program, Duke University Medical Center

David G. Kaufman, M.D., Ph.D.
Professor, Department of Pathology and Laboratory Medicine
School of Medicine
University of North Carolina at Chapel Hill

Robert J. Kavlock, Ph.D.
Director, Reproductive Toxicology Division
National Health and Environmental Effects Research Laboratory
United States Environmental Protection Agency

Kenneth S. Korach, Ph.D.
Chief, Laboratory of Reproductive and Developmental Toxicology
Scientific Program Director, Environmental Diseases and Medicine Program
National Institute of Environmental Health Sciences

George W. Lucier, Ph.D.
Director, Environmental Toxicology Program
National Institute of Environmental Health Sciences
(Retired, June 2000)

Suresh H. Moolgavkar, M.D., Ph.D.
Professor, Department of Epidemiology
University of Washington
Member, The Fred Hutchinson Cancer Research Center

Brooke T. Mossman, Ph.D.
Professor, Department of Pathology, College of Medicine
Director, Environmental Pathology Program
University of Vermont

Günter Oberdörster, D.V.M., Ph.D.
Professor, Department of Environmental Medicine
School of Medicine and Dentistry
University of Rochester

Richard B. Schlesinger, Ph.D.
Professor, Department of Environmental Medicine
New York University School of Medicine

Richard M. Sharpe, Ph.D.
Medical Research Council Human Reproductive Sciences Unit
Centre for Reproductive Biology
Edinburgh, Scotland

Gary D. Stoner, Ph.D.
Professor and Chair, Division of Environmental Health Sciences
School of Public Health
The Ohio State University

Raymond W. Tennant, Ph.D.
(ad hoc member)
Chief, Laboratory of Environmental Carcinogenesis and Mutagenesis
National Institute of Environmental Health Sciences

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Washington, DC
Daniel Caplin Professor of Law
School of Law
University of Virginia

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Covington & Burling
Washington, DC

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Assistant Corporate Secretary
(October 2000–February 2001)

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Bayer Corporation

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Vulcan Materials Company

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Vice President, Health Safety and Environment
Ethyl Corporation

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(Effective February 14, 2001)

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Vice President, Public Policy, Health, Environment and Safety
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(Resigned, December 31, 2000)

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Division of Bioengineering and Environmental Health Sciences
Professor, Department of Chemistry
Massachusetts Institute of Technology

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Chevron Research & Technology Company

Other Representatives

Larry Andrews, Ph.D., D.A.B.T.
Director of Toxicology
Rohm and Haas Company

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Senior Toxicologist, Product Stewardship
Environment, Health and Safety
Chevron Phillips Chemical Company

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Manager, Toxicology
Celanese

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Communications Committee
Manager, Toxicology and Risk Assessment
Honeywell International Inc.

James A. Deyo, D.V.M., Ph.D., D.A.B.T.
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Staff Toxicologist
Eastman Chemical Company

W. Mills Dyer, Jr., M.D.
Technical Fellow
Product Safety and Regulatory Programs
Eastman Chemical Company
(Retired, March 31, 2001)

Clay B. Frederick, Ph.D., D.A.B.T.
Strategic Planning Committee
Senior Research Fellow in Biochemical Toxicology
Research Section Manager
Rohm and Haas Company

Richard Henrich, M.S.
Finance Committee
Science Program Committee
Manager, Regulatory Affairs
Great Lakes Chemical Corporation

Michael A. Jayjock, Ph.D., C.I.H.
Science Program Committee
Senior Research Fellow and Manager of Risk Assessment, Toxicology Department
Rohm and Haas Company

Frederick R. Johannsen, Ph.D., D.A.B.T.
Science Program Committee
Senior Consultant, Toxicology
Solutia Inc.

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Science Program Committee
Manager, Global Toxicology Programs
General Electric Company

Thomas Keenan, Ph.D.
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Principal Toxicologist
Ashland Chemical Company

Florence K. Kinoshita, Ph.D.
Science Program Committee
Medical Department
Hercules Incorporated

Richard Kraska, Ph.D., D.A.B.T.
Science Program Committee
Manager of Toxicology
The Lubrizol Corporation

Charles E. Lambert, Ph.D.
Strategic Planning Committee
Unocal Corporation
(Resigned, December 31, 2000)

Steven C. Lewis, Ph.D., D.A.B.T.
Science Program Committee
Senior Toxicology Associate
Toxicology Division
ExxonMobil Biomedical Sciences, Inc.

Scott E. Loveless, Ph.D.
Communications Committee
Science Program Committee
Competencies Leader, Toxicological Sciences
Haskell Laboratory for Toxicology and Industrial Medicine
E. I. du Pont de Nemours and Company

Ellen Mihaich, Ph.D.
Science Program Committee
Senior Environmental Toxicologist
Rhodia Inc.

Ralph J. Parod, Ph.D.
Science Program Committee
Manager of Toxicology
BASF Corporation

Richard D. Phillips, Ph.D., D.A.B.T.
Science Program Committee
Director, Toxicology and Environmental Sciences
ExxonMobil Biomedical Sciences

Flora Ratpan, Ph.D.
Corporate Toxicologist
NOVA Chemicals, Inc.

Steven A. Signs, Ph.D., D.A.B.T.
Science Program Committee
Toxicologist, Product Safety and Compliance
The Lubrizol Corporation

Ralph G. Stahl, Jr., Ph.D., D.A.B.T.
Science Program Committee
Senior Consulting Associate
DuPont Corporate Remediation

Mark S. Swanson, Ph.D., D.A.B.T.
Manager, Toxicology
Vulcan Chemicals Company

Mary Jane Teta, Dr.P.H., M.P.H.
Director of Epidemiology, Health Information, Risk Assessment and TSCA
Union Carbide Corporation

Juergen H. Thyssen, Dr.med.vet.
Science Program Committee
Vice President, Toxicology
Bayer Corporation
(Retired, December 31, 2000)

CIIT Staff

Senior research associate Duncan Wallace pipettes a homogenized rat testis sample for analysis on a Coulter Counter® to determine sperm content of an animal exposed in utero to di(*n*-butyl) phthalate (DBP). He was a coauthor of a study published in 2000 that was used in a DBP risk assessment by the Center for the Evaluation of Risks to Human Reproduction, National Toxicology Program.

Senior Scientific Staff

Bahman Asgharian
Ph.D., State University of New York at Buffalo, 1988. Aerosol science, lung dosimetry modeling, inhalation toxicology.

Susan J. Borghoff
Ph.D., University of North Carolina at Chapel Hill, 1987. Diplomate, American Board of Toxicology. Chemical carcinogenesis, biochemical toxicology, kidney toxicology, metabolism and pharmacokinetics.

Rory B. Conolly
Sc.D., Harvard University, 1978. Diplomate, American Board of Toxicology. Mathematical modeling of biological systems, risk assessment.

J. Christopher Corton
Ph.D., University of Kansas, 1984. Toxicogenomics, receptor-mediated chemical carcinogenesis, liver toxicity.

David C. Dorman
D.V.M., Colorado State University, 1986. Ph.D., University of Illinois at Urbana-Champaign, 1990. Diplomate, American Board of Veterinary Toxicology. Diplomate, American Board of Toxicology. Neurotoxicology, olfactory toxicology, pharmacokinetics.

Jeffrey I. Everitt
D.V.M., Cornell University, 1977. Diplomate, American College of Veterinary Pathologists. Diplomate, American College of Laboratory Animal Medicine. Pulmonary and toxicologic pathology, chemical carcinogenesis.

Timothy R. Fennell
Ph.D., University of Surrey, 1980. Chemical carcinogenesis, endocrine toxicology, metabolism and pharmacokinetics, DNA and hemoglobin adduct dosimetry.

Paul M. D. Foster
Ph.D., Brunel University, 1977. Endocrine, reproductive, and developmental toxicology.

Kevin W. Gaido
Ph.D., West Virginia University, 1986. Molecular and cellular mechanisms of toxicity.

Gregory L. Kedderis
Ph.D., Northwestern University, 1982. Chemical carcinogenesis, biochemical toxicology, extrapolation from in vitro to in vivo.

Julia S. Kimbell
Ph.D., Duke University, 1988. Mathematical modeling, computer simulation, respiratory toxicology, risk assessment.

Frederick J. Miller
Ph.D., North Carolina State University, 1977. Dosimetry and extrapolation modeling of inhaled material, inhalation toxicology, risk assessment.

Owen R. Moss
Ph.D., University of Rochester, 1976. Dosimetry and impact of inhaled material on lung milieu.

Leslie Recio
Ph.D., University of Kentucky, 1986. Diplomate, American Board of Toxicology. Chemical carcinogenesis, mutagenesis, transgenic cancer models.

Paul M. Schlosser
Ph.D., University of Rochester, 1988. Mathematical modeling of physiological, biochemical, and cellular processes; human health risk assessment.

Susan C. J. Sumner
Ph.D., North Carolina State University, 1986. Chemical carcinogenesis, biochemical toxicology, transgenic animal models, analytical methods.

Brian A. Wong
Ph.D., California Institute of Technology, 1991. Inhalation toxicology, aerosol science.

Li You
M.D., Chongqing University of Medical Sciences, 1984. Ph.D., University of Georgia, 1996. Mechanisms of chemical effects on development mediated by steroid hormones.

Associate Scientists and Laboratory Managers

Edilberto Bermudez
M.S., University of Oklahoma, 1974. Diplomate, American Board of Toxicology. Respiratory toxicology.

Elizabeth A. Gross Bermudez
A.B., Harvard University, 1976. Upper respiratory tract toxicology, morphometry, comparative anatomy, histology.

Richard Arden James, Jr.
B.A., Thiel College, 1980. Inhalation toxicology.

Paul W. Ross
B.S., University of Florida, 1969. LATG, American Association for Laboratory Animal Science. Laboratory animal science.

Postdoctoral Fellows and Trainees

Norman J. Barlow
D.V.M., Michigan State University, 1996. Diplomate, American College of Veterinary Pathologists. Endocrine, reproductive, and developmental toxicology.

Alison K. Bauer
Ph.D., University of Colorado, 2000. Chemical carcinogenesis.

Scott E. Boley
Ph.D., Michigan State University, 1998. Chemical carcinogenesis.

Paul D. Cornwell
Ph.D., Indiana University, 2000. Chemical carcinogenesis.

Michael P. DeLorme
Ph.D., Wayne State University, 1999. Respiratory toxicology.

Georgette D. Hill
D.V.M., Tuskegee University, 1992. Respiratory toxicology.

Heiko U. Käfferlein
Ph.D., Friedrich-Alexander University, Erlangen, Germany, 2000. Chemical carcinogenesis.

Amy L. Lambert
Ph.D., University of North Carolina at Chapel Hill, 2000. Respiratory toxicology.

CIIT acquired the Provantis NT system in 2000 for automated data collection and analysis. The Provantis system provides integrated support for toxicology studies, including in-life studies, necropsy, histopathology, statistical analysis, and internal and regulatory reporting. Elizabeth Bermudez (front), who is Provantis system administrator, captures the weight of a tissue sample automatically. Denise Paschal is database administrator and provides computer support for the Provantis System.

Barry S. McIntyre
Ph.D., Washington State University, 1997. Endocrine, reproductive, and developmental toxicology.

Darren A. Robinson
Ph.D., Liverpool John Moores University, Merseyside, United Kingdom, 2000. Respiratory toxicology.

Cameron Q. Sheeler
Ph.D., University of Cincinnati, 2000. Endocrine, reproductive, and developmental toxicology.

Vincent R. Torti
Ph.D., University of North Carolina at Chapel Hill, 1998. Chemical carcinogenesis.

Katie J. Turner
Ph.D., University of Edinburgh, Scotland, 1996. Endocrine, reproductive, and developmental toxicology.

Katrina M. Waters
Ph.D., University of Wisconsin, 1996. Endocrine, reproductive, and developmental toxicology.

Michael E. Wyde
Ph.D., University of North Carolina at Chapel Hill, 2000. Endocrine, reproductive, and developmental toxicology.

Yun Zhang
Ph.D., University of Texas, Houston, 2000. Chemical carcinogenesis.

Carol R. Swaim, M.B.A.
Chief Financial Officer

Support Functions

Rusty J. Bramlage, M.P.H., M.B.A., SPHR, CCP, CBP
Human Resources Director

Ronald F. Geary, M.B.A., C.P.A.
Controller

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Computer Systems Manager

Erin N. Knight, M.S.L.S.
Librarian

Barbara J. Kuyper, Ph.D.
Science Editor and Publications Manager

Katharine S. Moore
Purchasing Specialist

Robert J. Nellis, M.S.J.
Communication Manager

Larry K. Pittman
Maintenance Manager

Patricia O. Pomerleau, M.S., RQAP
Quality Assurance Director

Carol R. Swaim, M.B.A.
Chief Financial Officer

Financial Trends

In Thousands

	HISTORIC			CURRENT	PROJECTED
	1996	1997	1998	1999	2000	2001
Changes in Unrestricted Net Assets						
Revenues and Gains:						
Contributions from Member Companies	$12,775	$12,966	$12,432	$12,094	$12,604	$12,500
Research Projects Funded by American Chemistry Council	0	0	0	3,419	3,500	3,500
Sponsored Research	4,264	3,174	2,293	2,099	1,258	1,889
Investment Income	356	389	339	83	359	200
Other Income	30	0	27	1	19	15
Total Unrestricted Revenues and Gains	17,425	16,529	15,091	17,696	17,740	18,104
Expenses and Losses:						
Chemical Carcinogenesis	5,098	3,389	3,168	3,697	3,453	3,208
Respiratory Toxicology	1,838	2,201	2,143	2,430	2,170	2,771
Endocrine, Reproductive, and Developmental Toxicology	2,170	2,314	2,537	2,373	2,113	2,958
Neurotoxicology	510	946	556	926	863	1,306
Other Research Programs	199	10	0	0	0	0
Direct Research Expenses	9,815	8,860	8,404	9,426	8,599	10,243
Management and Research Support	4,952	5,490	5,270	5,765	6,409	4,894
Facilities	2,777	2,901	2,740	2,977	2,912	2,843
Total Expenses and Losses	17,544	17,251	16,414	18,168	17,920	17,980
Change in Net Assets:	(119)	(722)	(1,323)	(472)	(180)	124
Net Assets at Beginning of Year:	10,468	10,349	9,627	8,304	7,832	7,652
Net Assets at End of Year:	$10,349	$ 9,627	$ 8,304	$ 7,832	$ 7,652	$ 7,776

Sponsorship

CIIT Member Companies

Air Products and Chemicals, Inc.
Albemarle Corporation
BASF Corporation
Bayer Corporation
Celanese
Chevron Corporation
The Dow Chemical Company
E. I. du Pont de Nemours and Company
Eastman Chemical Company
Eastman Kodak Company
Ethyl Corporation
ExxonMobil Chemical Company
General Electric Company
Georgia Gulf Corporation
W. R. Grace & Co.
Honeywell International Inc.
Johns Manville
The Lubrizol Corporation
Lyondell Chemical Company
Mallinckrodt Inc.
NOVA Chemicals Corporation
Novartis Corporation
Occidental Chemical Corporation
Owens Corning Corporation
Phillips 66 Company
PPG Industries, Inc.
Rohm and Haas Company
Shell Chemical Company
Solutia Inc.
Texaco Inc.
Union Carbide Corporation
Unocal Corporation
Volkswagen of America, Inc.
Vulcan Materials Company

American Chemistry Council Members

Air Liquide America Corporation
Air Products and Chemicals, Inc.
Akzo Nobel Chemicals Inc.
Albemarle Corporation
Anderson Development Company
Arch Chemicals, Inc.
Arizona Chemical, a Company of International Paper
Ashland Inc. — Distribution and Specialty Chemical Companies
ASHTA Chemicals Inc.
Astaris LLC
ATOFINA Chemicals, Inc.
ATOFINA Petrochemicals Inc.
Ausimont USA, Inc.
Avecia Inc.
Aventis CropScience North America
Avery Dennison Chemical Division (U.S.)
BaerLocher USA
Baker Petrolite Corporation
Basell
BASF Corporation
Bayer Corporation
The BFGoodrich Company
BOC Gases, A Division of BOC Group
Borden Chemical, Inc.
BP
The C. P. Hall Company
Cabot Corporation
Calgon Carbon Corporation
Cambrex Corporation
The Cardinal Companies LP
Carus Chemical Company, Division of Carus Corporation
Celanese
CHEMCENTRAL Corporation
ChemFirst Inc.
Chemical Products Corporation
Chevron Oronite Company LLC
Chevron Phillips Chemical Company
Church & Dwight Co., Inc.
Ciba Specialty Chemicals Corporation
Cognis Corporation
CONDEA Vista Company
Cooper Natural Resources
Croda Inc.
Crompton Corporation
Cytec Industries Inc.
D. George Harris and Associates
Daikin America, Inc.
Dakota Gasification Company
Degussa Corporation
Degussa Metals Catalysts Cerdec Corporation
Deltech Corporation
Dixie Chemical Company, Inc.
Dover Chemical Corporation
Dow
Dow Corning Corporation
DuPont
Durez Corporation
Dyneon LLC
Eaglebrook, Inc.
Eastman Chemical Company
Eastman Kodak Company, Synthetic Chemicals Division
El Dorado Chemical Company
Elementis Specialties
Eli Lilly and Company
EM Industries, Inc.
Engelhard Corporation
Enthone-OMI, Inc.
Equistar Chemicals, LP
Ethyl Corporation
ExxonMobil Chemical Company
Ferro Corporation
Fisher Scientific Company
Flexsys America L.P.
FMC Corporation
Gantrade Corporation
General Chemical Corporation
Georgia Gulf Corporation
Georgia-Pacific Corporation, Chemical Division
GE Plastics
The GNI Group, Inc.
Golden Bear Oil Specialties
Great Lakes Chemical Corporation
Halocarbon Products Corporation
Haltermann, Inc.
Harborchem
Hatco Chemical Corporation
Hercules Incorporated
Hickson Dan Chem Corporation
Honeywell
Huntsman Corporation
ICI Americas Inc.
IMC Chemicals Inc.
Infineum USA L.P.
International Specialty Products
JLM Industries Inc.
J.M. Huber Corporation
Johnson Polymer
Jones-Hamilton Co.
Kao Specialties Americas LLC
Kerr-McGee Chemical LLC
KMG Chemicals, Inc.
KRATON Polymers US LLC
Kronos, Inc.
Kuehne Chemical Company, Inc.
Lonza Group, Ltd.
The Lubrizol Corporation
Lyondell Chemical Company
3M
Marsulex Inc.
Merck & Co., Inc.
Merichem Company
Metachem Products, L.L.C.
Methanex Corporation
Millennium Chemicals Inc.
Milliken Chemical, Division of Milliken & Company
Mitsubishi Chemical America, Inc.
Mitsui & Co. (USA), Inc.
Monsanto Company
Nalco/Exxon Energy Chemicals, L.P.
Neste Chemicals Holding Inc.
Neville Chemical Company
Nexen Chemicals
The Norac Company, Inc.
NOVA Chemicals Corporation
Occidental Chemical Corporation
OCI Chemical Corporation
Octel-Starreon LLC
Olin Corporation
OM GROUP, INC.
Ondeo Nalco
Peak Chemical, L.L.C.
Perstorp Polyols, Inc.
Pioneer Americas, Inc.
PolyOne Corporation

PPG Industries, Inc., Chemicals Group
The PQ Corporation
Praxair, Inc.
Procter & Gamble, Chemicals Division
PVS Chemicals, Inc.
R. T. Vanderbilt Company, Inc.
Reichhold, Inc.
Reilly Industries, Inc.
Rhodia Inc.
Roche Carolina Inc.
Roche Colorado Corporation
Roche Vitamins, Inc.
RohMax USA, Inc.
Rohm and Haas Company
Rockwood Specialties Inc.
Ruetgers Organics Corporation
Safety-Kleen Corporation
Sartomer Company, Inc.
Sasol North America, Inc.
Schenectady International, Inc. (Chemical Division)
Shell Chemical Company
The Shepherd Chemical Company
Sika Corporation
Silbond Corporation
Sloss Industries Corporation
SNF Holding Company
Solutia Inc.
Solvay America, Inc.
Stepan Company
Süd-Chemie Inc.
Sunoco, Inc.
Texas Brine Company, LLC
Texas Petrochemicals LP
Tomah³ Products, Inc.
UCB Chemicals Corporation
UOP
Vantico Inc.
Velsicol Chemical Corporation
Vertex Chemical Corporation
Vulcan Chemicals, A Division of Vulcan Materials Company
W. R. Grace & Co.
Wacker Chemical Holding Corporation
Westlake Chemical Corporation
Westvaco Corporation, Chemical Division

Other 2000 Supporting Organizations

American Chemistry Council
American Petroleum Institute
The Chlorine Institute, Inc.
Ethyl Corporation
W. R. Grace & Co.
Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer
National Institute of Environmental Health Sciences
Nickel Producers Environmental Research Association (NiPERA)
Pharmacia & Upjohn, Inc.
Polyelectrolyte Producers Group, Verband TEGEWA e.V.
Styrene Industry Research Council
Union Carbide Corporation
United States Environmental Protection Agency

CIIT

CENTERS FOR HEALTH RESEARCH